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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/682,151	07/27/2001	Martin E. Kordes	XDEV1100	5628

25094 7590 10/15/2003

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EXAMINER

CHU, CHRIS C

ART UNIT PAPER NUMBER

2815

DATE MAILED: 10/15/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application N .

09/682,151

Applicant(s)

KORDESCH ET AL.

Examiner

Chris C. Chu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 April 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 - 15 is/are pending in the application.
- 4a) Of the above claim(s) 1 - 8 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 9 - 15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

1. Applicant's amendment filed on April 7, 2003 has been received and entered in the case.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 9 ~ 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beilstein, Jr. et al. in view of Tsuji et al.

Regarding claim 9, Beilstein, Jr. et al. discloses in Fig. 16A and column 7, lines 44 ~ 46 a semiconductor device comprising:

- a first active layer (65") including a first semiconductor material and having a first conductive type;
- a second active layer (67") including a second semiconductor material and having a second conductivity type opposite the first conductivity type, wherein the second active layer contacts the first active layer;

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- a third active layer (69'') including a third semiconductor material and having the first conductive type, wherein:
 - o the third active layer contacts the second active layer; and
 - o a combination of the first, second, and third active layers are at least part of a transistor;
- an opening (at the place of 83) extending through the third active layer and contacting the second active layer;
- a fourth semiconductor material (83) at least partially within the opening,
 - o wherein the fourth compound semiconductor material:
 - o has the second conductivity type and a dopant concentration higher than a dopant concentration of the second active layer; and is electrically connected to the second active layer; and an insulating layer (75' in Fig. 13) at least partially within the opening, wherein the insulating layer lies between the third active layer and the fourth compound semiconductor material.

Beilstein, Jr. et al. does not disclose compound semiconductor materials. However, Tsuji et al. teaches in column 3, lines 13 ~ 16 using compound semiconductor materials instead of semiconductor materials. Thus, it would have been obvious to one of ordinary skill in the art at the time when the invention was made to modify Beilstein, Jr. et al. by substituting compound semiconductor materials for semiconductor materials as taught by Tsuji et al. The ordinary artisan would have been motivated to modify Beilstein, Jr. et al. in the manner described above for at least the purpose of decreasing manufacture cost.

Regarding claim 10, Tsuji et al. teaches in column 3, lines 13 ~ 16 each of the first, second, third, and fourth compound semiconductor material including at least two Group IVA elements.

Regarding claim 11, Tsuji et al. teaches in column 3, lines 13 ~ 16 the first, second, third, and fourth compound semiconductor material comprising silicon carbide.

Regarding claim 12, Beilstein, Jr. et al. discloses in Fig. 16A electrical contacts (27" and 49 which is located under 83) to the third active layer and the fourth compound semiconductor material.

4. Claims 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Beilstein, Jr. et al. and Tsuji et al. as applied to claims 9 and 12 above, and further in view of Liu.

Regarding claim 13, Beilstein, Jr. et al. and Tsuji et al. disclose the claimed invention except for the electrical contacts being ohmic. However, Liu teaches in column 7, lines 64 and 65 electrical contacts being ohmic. Thus, it would have been obvious to one of ordinary skill in the art at the time when the invention was made to further modify Beilstein, Jr. et al. by using ohmic for the electrical contacts as taught by Liu. The ordinary artisan would have been motivated to further modify Beilstein, Jr. et al. in the manner described above for at least the purpose of providing an electrical ground (column 7, line 66).

Regarding claim 14, Beilstein, Jr. et al. discloses in Fig. 16A the device further comprising a second insulating layer (57) on the surface of the third active layer and surfaces of the second insulating layer and contacts furthest from the substrate (93) lie in substantially a

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same plane except for metal contacts. However, Liu teaches in column 4, lines 51 ~ 53 metal in the contact. Thus, it would have been obvious to one of ordinary skill in the art at the time when the invention was made to further modify Beilstein, Jr. et al. by using metal in the contacts as taught by Liu. The ordinary artisan would have been motivated to further modify Beilstein, Jr. et al. in the manner described above for at least the purpose of increasing speed of I/O data.

5. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Beilstein, Jr. et al. and Tsuji et al. as applied to claim 9 above, and further in view of Driver et al.

Beilstein, Jr. et al. and Tsuji et al. disclose the claimed invention except for the second active layer having a thickness in a range of approximately 0.1 – 2 microns. However, Driver et al. discloses in column 4, lines 24 ~ 34 an active layer having a thickness in a range of approximately 0.1 – 2 microns. Thus, it would have been obvious to one of ordinary skill in the art at the time when the invention was made to further modify Beilstein, Jr. et al. by using the thickness in a range of approximately 0.1 – 2 microns for the second active layer as taught by Driver et al. The ordinary artisan would have been motivated to further modify Beilstein, Jr. et al. in the manner described above for at least the purpose of decreasing doping concentration (column 4, lines 28 ~ 34).

Response to Arguments

6. Applicant's arguments filed on April 7, 2003 have been fully considered but they are not persuasive.

On page 5, applicant argues "claim 9 includes a fourth compound semiconductor material in the opening and the fourth compound semiconductor material is electrically connected to the second compound semiconductor material." This argument is not persuasive. Beilstein, Jr. et al. and Tsuji et al. disclose in Fig. 16A a fourth compound semiconductor material (83) in the opening (at the place of the 83) and the fourth compound semiconductor material is electrically connected to the second compound semiconductor material (67").

For the above reasons, the rejection is maintained.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chris C. Chu whose telephone number is (703) 305-6194. The examiner can normally be reached on M-F (10:30 - 7:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C. Lee can be reached on (703) 308-1690. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

Chris C. Chu
Examiner
Art Unit 2815

c.c.
October 6, 2003



EDDIE LEE
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